

Examiner Chester T. Barry
Appln. of Redmon et al.
Ser. No.: 10/667,893
Response of 2/14/2006

All four pending claims have been rejected on a primary document, **Rindt** ("On-line Respirometer and Method of Using the Same", J. Rindt, U.S. Patent 6,005,872, filed in **2002**) in combination with any one of six secondary documents.

The secondary documents include: **MOP21** ("Instrumentation in Wastewater Treatment Plants", Water Pollution Control Federation, Manual of Practice 21, **1978**), **MOP OM5** ("Process Instrumentation & Control Systems", Water Pollution Control Federation, Manual of Practice OM-5, **1984**), **Yust** ("Control of the Specific Oxygen Utilisation Rate for the Step-feed Activated-sludge Process", L.J. Yust, et al., Transactions of the Institute of Measurement and Control, **1984**), **Tanuma** ("Dissolved Oxygen Control Using Aeration Exhaust Gas", R. Tanuma, et al., Water Science and Technology, **1981**), **Hallas I** ("Device for Controlling the Bioactivity of Biological Systems", E. Hallas, DE4229550, **1994**), and **Hallas II** ("Method of Determining the Degradation of Carbonaceous Materials and the Nitrification in Biological Systems", E. Hallas, DE19509777, **1996**)

The rejection is predicated on portions of the content of the primary and secondary documents and on the conclusion, stated on page 3 of the office action, that

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It would have been obvious therefore to have used the calculated OUR rate determined by the Rindt apparatus or method to control the air flow rate, return sludge rate, or waste sludge rate via a PLC controller or the like and control valve or the like.

It is respectfully submitted that, at the time the present invention was made, each of the seven documents involved in the six resultant document combinations failed to provide sufficient motivation or guidance to cause one of ordinary skill to combine their teachings to arrive at the invention. It is respectfully submitted that adequate reasons exist to support a finding that the present invention represents non-obvious subject matter.

Respirometry, illustrated by Rindt's recent patent, is a still-active specialty that has existed within the field of wastewater treatment for many years. Inventor Redmon performed respirometry experiments in undergraduate training in the science of wastewater treatment approximately three decades ago.

As noted in the office action, the 1984 publication, MOP OM5, as Rindt does, discusses on-line respirometry as an existing art. Although Rindt, having filed in 2002, had all of the secondary documents available to him, he did not attempt what was said (in the rejection) to be obvious from his teachings and those of the secondary documents (using calculated

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OUR from his apparatus or method to control air flow rate, return sludge rate, or waste sludge rate via a PLC controller and control valve).

There are some important “disconnects” between the conditions in respirometry and those in the tank of a “real-world” wwtp (wastewater treatment plant). These may shed light on why Rindt, having had available to him his own teachings and all those of the secondary documents, failed to do what the rejection says was obvious to do.

In respirometry one typically isolates from an active, full-scale tank of a wwtp a sample containing bacteria flocs and food (e.g., both solid and dissolved waste) for the purpose of determining bio-activity of the bacteria in the sample. The sample is typically aerated in a reaction chamber that is relatively minute, as compared to the tank, and usually has quite different reaction conditions, as compared to the tank.

Rindt's data is based on starting his analysis at a DO of about 10. See Figures 2 and 3. This would be considered a very unattractive level at which to operate a wwtp tank. Although the DO in Rindt's liquid phase declines in Figure 3, the F/M ratio is also reducing progressively. Thus, it would be purely accidental if at any point in the operation of Rindt's device

both the F/M ratio and the DO level would coincide with what was actually the case in the tank from which samples were being withdrawn.

Typically, respirometry methods require relatively high DO levels, e.g., greater than 3 mg/l, at least at the start of their batch operations. This would be considered an uneconomical DO for wwtps. A wwtp tank can at times experience DO levels, e.g., 0, ½ or 1 mg/l, which would not ordinarily be acceptable at the start up of a respirometer.

OUR data typically available from respirometry can be useful to plant operators for assessing the general condition of the bacteria in their plants. However, due to the above-described “disconnects” and on occasion other differences in conditions between respirometry and “real-world” wwtp tank conditions, such OUR data has differed enough from actual oxygen uptake rates in full-scale tanks to present a significant challenge to its use as a basis for successful automatic plant control.

The conclusion of obviousness stated in the rejection has not made clear how this non-representative OUR data could be utilized successfully as the basis for automated control of a wwtp. None of the secondary documents, with publication dates ranging from 1978 to 1996, give enough

guidance to accomplish this. Both MOP21 (1978) and MOP OM5 (1984) fail in this respect.

The other secondary documents do not help sufficiently. The abstract which we have provides no evidence that Yust and his colleagues discuss how to render respirometry useful as a basis for automated control of a tank which, like the tanks of common wastewater treatment plants, are processing fluctuating loads. Yust, et al. measure SCOUR (specific carbon oxygen uptake rate), a form of OUR, and control to a selected OUR set point. Maintaining OUR at a selected set point will not provide adequate control in tanks with fluctuating loads. Thus, it should be apparent that in a tank controlled with the aid of Rindt's apparatus using an OUR set point as taught by Yust, et al., the selected OUR set point will not be representative of the varying amounts of oxygen required to treat the fluctuating amounts of waste in that tank.

Tanuma and the two Hallas documents (DE4229550 ("Hallas I") and DE19509777 ("Hallas II")) also fail to discuss how to make respirometry useful as a basis for automated plant control. As shown by their sentence bridging pages 184-185, Tanuma et al. use data from a hood to maintain a constant partial pressure of oxygen in the tank offgas. Hallas I applies a hood and vaguely disclosed related control system to a tank. However, the

control strategy apparently applied here apparently represents an attempt, as shown at page 2, full paragraph 5, sentences 2 and 3 of the translation Applicants obtained, to maintain a "desired value" or set point of oxygen or CO₂ in the hood. From the partial translation of Hallas II that Applicants obtained, they are unable to discern that Hallas II employs other than the same kind of set point proposed in Hallas I. A number of factors will cause an oxygen partial pressure set point to repeatedly diverge from process oxygen requirements. Thus, it should be apparent that in following the teachings of each of these three documents, when conditions in the plant vary, as they commonly do in wwtps, the air flow produced by adherence to the selected set points will not be representative of the varying amounts of oxygen which are required in the wastewater treatment process.

In summary, applicants respectfully submit that the primary and secondary documents fail to provide clear enough guidance to make it obvious to combine them in such a way as to arrive at the present invention. This conclusion is supported both by the lengthy existence of the art of respirometry and by the constant efforts that have been made to provide automated control of wastewater treatment plants, both of which have been active for several decades. Had the present invention been obvious, it would surely have emerged well prior to Rindt. Yet, when Rindt did his work, while having available his own teachings and those of every

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one of the secondary documents, he failed to do what the rejection says was obvious. Further support for a finding of non-obviousness is found in the above-described “disconnects” between respirometry and the conditions that typically occur in wastewater treatment tanks. Still further support is provided by the fact, as the nature (§103) of the rejection acknowledges, following the teachings of Yust, Tanuma and Hallas without Rindt’s quite different teachings does not lead to the present invention.

There was also a rejection of Claims 1-2 (§112, ¶ 2) having to do with the phrase “exercises continuing control” and particularly in regard to the meaning of “continuing”. It is believed that the presence of the following definition of “continuing” at lines 12-15 of page 67 of the disclosure should prevent any confusion as to the meaning of this term or the quoted phrase in which it is used in the claims:

“Continuing”, for example as in the exercise of continuing control or the taking of continuing measurements, refers to actions taken on a continuous basis or on an intermittent but repetitive, including a periodic or irregularly repeating basis.

It is believed therefore that there is no lack of particularly pointing out or distinctly claiming in connection with this word or phrase.

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In the circumstances, Applicants respectfully suggest that reasons exist which support the patentability of the present invention, as presently claimed, and therefore courteously solicit withdrawal of the rejections.

The undersigned will be traveling from February 16 through about April 15, and will be outside the U.S. from February 27 through March 26. During most his absence, he can be reached by cell phone (240-731-1083), but there may be periods of up to five days when cell coverage may be sporadic or non-existent while he is outside the U.S. During his entire absence, his mail, facsimile machine and email account will be monitored daily. Patent attorney Randall G. Erdley, counsel to the undersigned, will be available to accept emergency telephone calls at 301-208-9315 (except between April 7 and 15, 2006). If after the undersigned returns he can assist in dealing with any issues relating to the case, he will gladly do so.

Respectfully submitted,

Dated: February 14, 2006



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